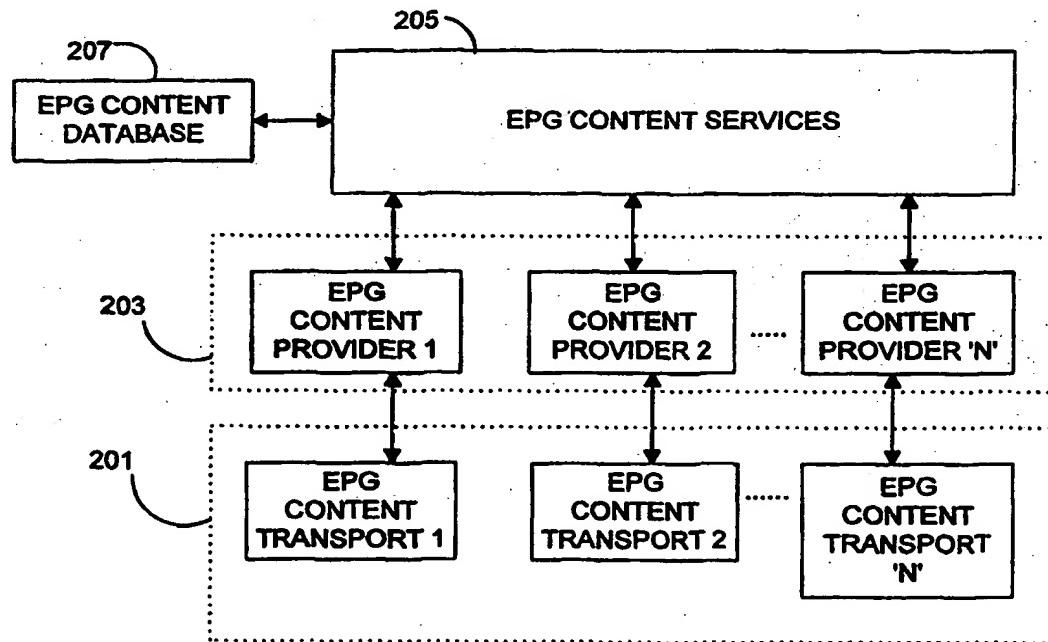




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(54) Title: SYSTEM FOR COMBINING ELECTRONIC PROGRAM GUIDE DATA



(57) Abstract

An electronic program guide (EPG) system combines different sources of television program guide data supplied by different providers into a unified data store. When different sources provide similar data, the EPG system combines the program guide data from the multiple sources in accordance with criteria such as quality of the data, timeliness of the data, and timeliness of the data provider.

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System for Combining Electronic Program Guide Data

Related Applications

This application is related to the co-assigned and co-filed applications, "Method for managing multiple channel maps from multiple input devices in a multimedia system," "System for time-shifting events in a multi-channel convergence system," "Method and system for associating web sites to television programs," "Individualized parameter control for multiple media sources in a data processing system," "System for scheduled caching of in-band data services," and "Integration of Internet sources into an electronic program database list," all of which are hereby incorporated by reference.

Field of the Invention

The present invention is related to electronic program guides and in particular to retrieving and combining electronic program guide data from more than one provider.

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Background of the Invention

One of the current trends in consumer electronics is the convergence of television technology and computer technology. Starting with the inclusion of a simple microprocessor chip in a television set, the convergence of the two technologies has evolved into sophisticated personal computers equipped with television tuners and large VGA monitors. Convergence systems enable the user to perform data processing tasks while simultaneously viewing a broadcast television program. Standard television add-ons, such as VCR's or laser disks, increase the content choices available to the user. The advent of personal satellite receivers has also opened up a vast range of broadcast content.

However, the number of channel choices also requires the user scrutinize many pages of printed schedules and program information to find the programs the user is

interested in watching. One existing approach to managing the great amount of scheduling and program information available is to organize the information in an electronic program guide (EPG). The data for an EPG is downloaded from a particular provider to a microprocessor either in the television or in an attached device. The 5 program guide data is stored in a data store, such as a database, and displayed on the television screen when the user requests. The source of the information differs from provider to provider. For example, StarSight Telecast, Inc. places program guide data in the vertical blanking interval in the broadcast television signal, Direct TV™ and Echostar Communications Corp. use a portion of the MPEG2 (Motion Picture Experts .10 Group) digital satellite data stream, and TV Host and Intel Corp.'s Smart TV® require a dial-up telephone connection. The data stores created from the source information are proprietary to the provider and are incompatible.

Because of the incompatibilities, an EPG user currently must chose a single provider from which to receive program guide data. However, television schedules are often in flux and some providers reflect the changes more quickly than others. 15 Furthermore, the program information given by one provider may be good for one category of program but poor for another category.

Therefore, there is a need for an EPG system that receives program guide data from different sources and resolves conflicts among the data.

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Summary of the Invention

An electronic program guide (EPG) system combines data from multiple EPG content providers and organizes the EPG data into an EPG content data store. The EPG system includes an EPG content services function which creates and manages the EPG content data store; a plurality of EPG content transport functions that retrieve the EPG data provided by the EPG content providers from multiple sources and in multiple source-specific formats and a plurality of EPG content provider function which convert the source-specific formatted EPG data into a format compatible with the EPG data store. The EPG content services function also includes a conflict resolution function 25

which determines what EPG data is of higher quality or more timely when similar data is received from more than one source. In addition, the EPG content services function registers new EPG content providers into the EPG data store. The data structure of the EPG data store is also described, as is a specific arrangement of modules that implement processes necessary for the operation of the EPG system.

Additionally, a system for combining EPG data in multiple formats from a plurality of sources using a content organizer is described. The multiple EPG formats are combined into a single EPG data format. The content organizer includes an EPG content data store created and managed by an EPG content services function, a plurality of EPG content transport functions which retrieves the EPG data from the plurality of sources, and an EPG content provider function which converts the EPG data from the multiple formats to an EPG content data store format for storage in the EPG content data store. A specific arrangement of modules for the content organizer is also described.

Because the EPG system of the present invention retrieves EPG data supplied by multiple EPG content providers through different sources and organizes the EPG data into a single data store, the viewer is not required to select a single provider, be reliant on a single source for the information, or become familiar with multiple EPG systems. Thus, the EPG system gives the viewer more selections, provides more dependability, and makes the EPG data more accessible. Furthermore, because the EPG system resolves conflicts between the data from different providers based on data quality or timeliness, the viewer has access to better and more reliable information.

Brief Description of the Drawings

- Figure 1A is a block diagram of hardware components for a convergence system utilizing an electronic program guide (EPG) system.
Figure 1B is a block diagram of a digital processing system shown in Figure 1A.
Figure 1C is a block diagram of a software architecture executing in the digital processing system of Figure 1B.

- Figure 2 is a block diagram of four primary modules of one embodiment of an EPG system operating in the software architecture of Figure 1C.
- Figure 3 is a block diagram of one embodiment of an EPG content data store in the EPG system of Figure 2.
- 5 Figure 4 is a field layout diagram of a provider record in the EPG content data store of Figure 3.
- Figure 5 is a field layout diagram of a guide record in the EPG content data store of Figure 3.
- 10 Figure 6 is a field layout diagram of a channel record in the EPG content data store of Figure 3.
- Figure 7 is a block diagram of the EPG content data store of Figure 3 showing detailed tables associated with an event table.
- Figure 8 is a field layout diagram of an event record in the EPG content data store of Figure 7.
- 15 Figure 9 is a field layout diagram of an event title record in the EPG content data store of Figure 7.
- Figure 10 is a field layout diagram of an event description record in the EPG content data store of Figure 7.
- Figure 11 is a field layout diagram of an event extension record in the EPG content data store of Figure 7.
- 20 Figure 12 is a field layout diagram of an event start record in the EPG content data store of Figure 7.
- Figures 13-15 are operation flow diagrams of the processes of the EPG system of Figure 2.

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Description of the Embodiments

In the following detailed description of the embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These

embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural, logical and electrical changes may be made without departing from the spirit and scope of the present inventions. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present inventions is defined only by the appended claims.

The leading digit(s) of reference numbers appearing in the Figures corresponds to the Figure number, with the exception that the same reference number is used throughout to refer to an identical component which appears in multiple Figures.

10 Signals and connections may be referred to by the same reference number or label, and the actual meaning will be clear from its use in the context of the description.

Electronic Program Guide System Overview

An electronic program guide (EPG) system of the present invention organizes schedule and program information from multiple EPG content providers through differing sources and presents a single, optimized menu to the user based on criteria such as quality of the data, timeliness of the data, and timeliness of the program guide provider. The EPG system is part of a convergence system 100 shown in Figure 1A, such as the Destination personal computer system available from Gateway 2000, Inc.

20 The convergence system 100 incorporates television tuner circuitry into a digital processing system 101, such as a computer which is compatible with standard personal computer systems, and displays television signals and digital output on a large monitor 122 of VGA or better resolution. The EPG system is described in terms of software processes which execute within a microprocessor 186 in the digital processing system 101, as shown in Figure 1B. The processes for the EPG system can be implemented in software, hardware or firmware without departing from the scope of the invention. One embodiment of a software architecture which provides the underlying infrastructure of processing and file input/output operations necessary for the execution of the EPG system is illustrated in Figure 1C. The EPG system operates as part of the system

services 103 and is represented in Figure 1C as EPG data services 109. The software architecture illustrated in Figure 1C is described in detail in co-pending and co-assigned patent application entitled "Architecture for Convergence Systems" filed on the same day as the present application and assigned to the same assignee, which application is hereby incorporated by reference.

In the context of the present application, an "EPG content provider" is a company that supplies program guide data and a company that provides the audio, video and/or data transmitted in a channel is referred to as a "channel content provider." A single company can be both a channel content provider and an EPG content provider.

- .10 The EPG data may be transmitted either in-band or out-of-band, as known by those of ordinary skill within the art.

In one embodiment, the EPG system 200 comprises four primary modules as illustrated in Figure 2: a plurality of EPG content transport functions 201, a plurality of EPG content provider functions 203, an EPG content services function 205, and an EPG content data store 207. Arranging the tasks performed by the EPG system into different modules will be readily apparent to one skilled in the art upon reading the detailed descriptions below.

- The EPG content transport functions 201 move guide data from various sources and into a storage area, such as a hard disk 107, on the digital processing system 101.
- 20 Each EPG content transport function 201 is specific to the particular source, such as the vertical blanking interval in the broadcast television signal, an MPEG2 data stream transmitted via satellite, a phone line, hard media such as CD-ROM, or some other communications means. The EPG content provider functions 203 convert the guide data from source-specific formats into a format understood by the EPG content services functions 205. Detailed information on a source-specific format necessary to support the conversion can be in the public domain, obtained from standards publications, or licensed from the owner of a proprietary format.
- 25

The EPG content services function 205 stores the converted guide data into the EPG content data store 207, resolving conflicts and combining information from the

different EPG content providers according to user preferences as described further below. The EPG content services function 205 also provides an interface for other applications to access the EPG content data base 207 or the EPG content providers through the EPG content provider functions 203.

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EPG Content Data store

Figure 3 illustrates data structures in one embodiment of the EPG content data store 207. The data store 207 comprises a provider table 301, a guide table 303, a guide descriptor table 305, a channel table 307, a channel descriptor table 309, a channel region table 311, a channel extension table 313, a service type table 315, a service table 317, and an event table 319. While the EPG content data store 207 is described in terms of tables in a relational database system, one skilled in the art will readily appreciate that the data contained in the data store 207 can be stored in any type of data structure, including flat files or look-up tables, without departing from the scope of the invention.

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15 A brief overview of each data structure is given next, with detailed descriptions following.

The provider table 301 describes the EPG content providers that are registered with the EPG content services function. The registration process is described in detail below. Each provider can supply more than one program guide. The guide table 303 identifies which program guides for a provider are managed by the EPG content services function 203. The guide descriptor table 305 provides a description of each guide in the guide table 303 in one or more languages. The channel table 307 identifies which channels are described in a guide. The channel description table 309 provides a description of each channel in the channel table 307 in one or more languages. The channel region table 311 identifies regions (countries, local regions, etc.) in which each channel in the channel table 307 is accessible. The channel extension table 313 identifies any external data associated with a channel in the channel table 307, such as a World Wide Web Internet site or multimedia files stored on media accessible by the convergence system 100. The service type table 315 indicates what type of content,

such as audio, video, or data, is available on each channel in the channel table 307. The services table 317 enumerates which source services, i.e., the communications links for downloading the guide data, are supported by each provider. The event table 319 contains program information for each event on a channel during the time period covered by a program guide that contains the channel.

The provider table 301 comprises a plurality of provider records. One embodiment of a provider record 400 is shown in Figure 4. A provider identifier field 401 contains a unique identifier for each EPG content provider. A provider type field 403 identifies whether the EPG content services function 205 must request an update of the guide data from the EPG content provider, or whether the provider operates autonomously and notifies the EPG content services function 205 when its guide data has changed.

A provider timeliness field 405 indicates how often the provider updates the data it receives from the channel content owner. For example, the provider may supply new guide data every four hours, but the only difference between each update is that the four hours prior to the update time are truncated and the four hours following the update time are included. Schedule or information changes supplied to the EPG content provider by the channel content provider are not reflected in the update. The provider timeliness field 405 for such an EPG content provider would contain a value representing "low" timeliness. For an EPG content provider that changes data in the guide on a daily basis, the provider timeliness field 405 contains a value representing "medium" timeliness.

For an EPG content provider that changes data in the guide on an hourly basis, the provider timeliness field 405 contains a value representing "high" timeliness. Other update frequencies, such as more than once a day, can also be designated as being of "high" timeliness.

A provider next-update field 407 contains a time at which the EPG content services function 205 should ask for an update to the guide data. A provider quality field 409 contains values which represent ratings of various content categories with respect to the quality of the descriptions supplied by the provider. For example, one

EPG content provider may provide better movie descriptions while another may provide better sports descriptions. The provider quality field 409 is user-defined.

A service provider name field 411 is a text description of the services made available by the channel content provider, such as audio, video, or data. A content provider name field 413 is a text description of the EPG content provider. A guide provider name field 415 is a text description of the guide provided by the EPG content provider.

The guide table 303 comprises a plurality of guide records, one for each guide supplied by a provider. One embodiment of a guide table record 500 shown in Figure 5.

A guide identifier field 501 contains a unique identifier for each program guide. A provider identifier field 503 identifies the EPG content provider that initialized (and generally owns) the guide. A starting slot field 505 contains a time for the first time slot that is represented in the guide and a starting day field 507 designates the day of the week for the first time slot. If the guide extends beyond one week, the starting day field 507 includes the appropriate week, month, and/or year values. A validity field 509 rates the validity of the data in the guide. If the provider performs some sort of comparison of the data in the guide, the value in the validity field 509 represents a "high" validity rating. If the previous update (as determined by the provider next-update field 407) has not been able to run as scheduled, or if the data in the guide has expired as defined by a lifetime field 511, the value in the validity field 509 represents a "low" validity rating. The lifetime field 511 contains a value indicating the latest date/time before which the provider expects the guide will be updated. A guide width field 513 contains a value which represents the period of time included in the guide, measured in "slots." A slot length field 515 defines the number of seconds represented by a slot, such as 108000 seconds (30 minutes).

The channel table 307 comprises a plurality of channel records. One embodiment of a channel record 600 is shown in Figure 6. The channel table 307 contains a channel record 600 for each channel included in a program guide that is supplied by an EPG content provider.

A guide identifier field 601 designates the guide that contains the channel's information. A provider identifier field 603 refers to the channel content provider responsible for the channel. A display channel number field 605 contains the channel number which is displayed on the monitor. A physical channel number field 607 5 contains the physical transmission number of the channel on a particular device, such as a satellite receiving station. A short name field 609 holds the channel's call letters while a long name field 611 holds the channel's full name. A conditional access field 613 indicates what level of conditional access is associated with the channel, such as pay-per-view or subscription content. A number-of-streams field 615 contains a value 10 defining the number of audio, video, and data streams associated with the channel. A purchase information field 617 provides data on purchasing the channel, if such purchase is necessary.

Figure 7 illustrates one embodiment of the event table 319 that is associated with each channel stored in the channel table 307. In this embodiment, the provider table 15 301 is logically connected to one or more channel tables 307. Each channel table 307 is logically connected to one or more event tables 319. The event table 319 comprises a plurality of event records 800 (as shown in Figure 8). Each event record comprises an event identifier field 801, a title field 803, a description field 805, an extension field 807, a start time field 809, and end time field 811, a duration field 813, a category field 20 815, a subcategory field 817, a closed captioning flag 819, a subtitles flag 821, a taping flag 831, and a plurality of ratings fields 825. For example the ratings fields 825 can contain a TV rating field, an MPAA movie rating field, a content advisory field, a violence rating field, a language rating field, a sexual content rating field, and a V-chip rating field. The number of ratings fields 825 is variable and depends on the number of 25 rating tables provided by the program guide providers. Rating tables are described below.

The event identifier field 801 contains a unique identifier for each event. The title field 803 contains references to one or more event title records 900 in an event title

table 701. Each event title record 900 comprises a language identifier field 901 and a title field 903 that contains text for the title as illustrated in Figure 9.

The description field 805 contains references to one or more event description records 1000 in an event description table 703. In one embodiment shown in Figure 10, 5 an event description record 1000 comprises a language identifier field 1001 and a description field 1003 that contains text for the description.

The extension field 807 contains references to one or more event extension records in an event extension table 705. One embodiment of an event extension record 1100 is shown in Figure 11. Each event extension record 1100 comprises at least one 10 external data field 1101 which identifies a data source associated with a channel, such as a World Wide Web Internet site or a multimedia file.

The start time field 809 contains references to one or more event start records 1200 stored in an event start table 707. As shown in Figure 12, in one embodiment, each event start record 1200 comprises a day field 1201 and a slot field 1203 which 15 together define the beginning of the event. The end time field 811 can contain a value representing the ending time of the program supplied by the guide data provider, a reference to one or more event ending records similar to the event start records 1200, or be blank. If the end time field 811 is blank, the ending time of a program can be calculated from the start time field 809 and the duration field 813 if the duration field 20 contains a value. Alternatively, the ending time of a program can be implied from the start time field 809 for the event immediately following.

The category 815 and subcategory 817 fields contains a category and a subcategory identifier from a category table 709 and a subcategory table 711 respectively. The closed captioning flag 819, subtitles flag 821, and the taping flag 823 indicate when the event contains closed captions, subtitles, or is scheduled for taping by 25 the convergence system 100.

Each of the rating fields 825 in the event record 800 contains a value selected from entries in corresponding tables in the EPG database 207. Using the example tables shown in Figure 7, a TV ratings field contains a TV rating from a TV rating table 713,

an MPAA ratings field contains an MPAA rating from a MPAA rating table 715, a content advisory field contains a content advisory rating from a content advisory rating table 717, a violence rating field contains a violence rating from a violence rating table 719, and a sexual content rating field contains a sexual content rating from the sexual content rating table 721. Additional rating fields and related tables can be added to the event table record 800 and the EPG data store 207 as new rating systems are introduced and supplied by the guide data providers.

EPG System Operation

.10 The operation of the EPG system 200 is shown in Figures 13-15 which illustrate the processes performed by the EPG content services function 205.

Figure 13 illustrates the registration process initiated by the EPG content services function 205 to register a new EPG content provider in the data store 207. The registration process 1300 creates a provider record 400 (step 1301), fills in the appropriate fields (1303), and stores the provider record 400 in the provider table 301 in the EPG data store 207 (1305). If no additional EPG content providers are to be registered (step 1307), the registration function exits; otherwise it loops back to step 1301.

Once the EPG content provider is registered, the EPG content provider function 203 uses the appropriate EPG content transport function 201 to retrieve the guide data from the source. The EPG content provider function 203 then converts the retrieved data from the content provider-specific formats into the appropriate EPG data store record formats which are passed to the EPG content services function 205. The EPG content services function 205 stores the records in the EPG content data store 207 using an update data store process shown in Figure 14. For a newly registered EPG content provider (step 1401), the update data store process 1400 stores a guide record 500 for each guide supplied by the EPG content provider (steps 1403 and 1405) and stores a channel record 600 for each channel contained within each guide supplied (steps 1407 and 1409). If the event record received from the EPG content provider function 203 is

unique (step 1411), the update data store process adds an event record 800 into the data store 207 (step 1413). An event is not unique if there is an existing event record 800 associated with the same channel record 600 and which contains a value in the start time field 809 that overlaps the time slot of the new event. If an event is not unique, a conflict resolution process within the EPG content services function 205 resolves the conflict (step 1415).

The operation of the conflict resolution process is shown in Figure 15. The conflict resolution process 1500 compares data for the existing and new event records (step 1501). In one embodiment, the comparison evaluates event record fields such as the title field 803, the description field 805, the ratings fields 825, and the conditional access field 613 in the associated channel record 600. Alternate embodiments that evaluate different data fields will be apparent to one skilled in the art.

If the data matches exactly (step 1503), the new event record is discarded as a duplicate (step 1505). A mismatch occurs if the data for the existing event does not exactly match the corresponding data for the new event record. Mismatches are handled in several ways.

If the new event has data that the existing event record lacks (step 1507), the new data is merged into the existing event record (step 1509). However when there is conflicting data, the conflict resolution process 1500 selects a conflict resolution algorithm based on the field(s) in conflict, or on the provider of the data, or the source of the data, or a combination thereof (step 1511). The conflict resolution algorithm determines which of the conflicting records is selected as valid.

One embodiment of a conflict resolution algorithm is selected if the title 803, start time 809, end time field 811 (or the calculated or implied ending time as described above), or conditional access 613 fields are different. The selected conflict resolution uses the data from the EPG content provider that has a value representing higher quality timeliness in the timeliness field 405 in its provider record 400. In another embodiment of a conflict resolution algorithm selected when the description fields 805 are different, the event record with a higher quality description text in its description field 805 is

chosen. Higher quality descriptions contain more relevant words (words such as "a," "and," and "if" not considered relevant) and include more proper names, such as those of people or places. In yet another alternate embodiment, a conflict resolution algorithm compares the provider quality fields 409 to determine the event record with the higher
5 quality description.

The conflict resolution process 1500 updates the data store 207 by storing the new event record (step 1515) if the new record is selected by the conflict resolution algorithm. If there has been a change in an event's starting time or ending time (step 1517), the conflict resolution process 1500 requests the event record for each event that follows the modified event from the EPG content provider function 203 that provided the modified event record (step 1519). The conflict resolution process 1500 determines subsequent event records are not needed when the starting and ending times in a subsequent event record in the data store 207 are the same as those provided by the EPG content provider function 203, i.e., the events "re-align" (step 1521).

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Conclusion

Because the EPG system of the present invention retrieves EPG data supplied by multiple EPG content providers through different sources and organizes the EPG data into a single data store, the viewer is not required to select a single provider, be reliant
20 on a single source for the information or become familiar with multiple EPG systems. Thus, the EPG system gives the viewer more selections, providing more dependability, and makes the data more accessible. Furthermore, because the EPG system resolves conflicts between the data from different providers based on data quality, the viewer has access to more timely and reliable information.

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It is to be understood that the above description is intended to be illustrative, and not restrictive. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. The scope of the invention should, therefore, be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

What is claimed is:

1. A computerized system for combining electronic program guide (EPG) data from multiple EPG content providers, the system comprising:

- 5 an EPG content data store;
- an EPG content services function operable for creating and managing the EPG content data store;
- a plurality of EPG content transport functions operable for retrieving EPG data from a plurality of sources in a plurality of source-specific formats; and
- 10 a plurality of EPG content provider functions, each EPG content provider function operable for receiving the EPG data in a source-specific format from an EPG content transport function, converting EPG data from a source-specific format to an EPG content data store format, and delivering the EPG data in the EPG content data store format to the EPG content services function.

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2. The computerized system of claim 1, wherein the EPG content services function is further operable for registering each EPG content provider in the EPG content data store.

20 3. The computerized system of claim 1, wherein the EPG content services function is further operable for resolving conflicts between similar EPG data from the multiple EPG content providers.

25 4. The computerized system of claim 3, wherein the EPG content services function determines if a conflict exists between the similar EPG data by comparing channel values and start time values contained in the EPG data.

5. The computerized system of claim 3, wherein the EPG content services function resolves a conflict between the similar EPG data by selecting the EPG data containing a value representing higher quality timeliness.
- 5 6. The computerized system of claim 3, wherein the EPG content services function resolves a conflict between the similar EPG data by selecting the EPG data containing a description of higher quality.
- 10 7. The computerized system of claim 3, wherein the EPG content services function resolves a conflict between the similar EPG data based on the provider of the EPG data.
8. The computerized system of claim 1, wherein at least one of the sources is an in-band source.
- 15 9. The computerized system of claim 1, wherein at least one of the sources is an out-of-band source.
10. A method of combining electronic program guide (EPG) data from multiple EPG content providers comprising the steps of:
 - 20 registering an EPG content provider in an EPG content data store;
 - retrieving EPG data from a source in a source-specific format;
 - converting the EPG data from the source-specific format to a format for the EPG content data store;
 - adding the converted EPG data to the EPG content data store when there is no conflict between the converted EPG data and EPG data existing in the EPG content data store;
 - 25 resolving conflicts between the converted EPG data and existing EPG data; and
 - updating the EPG content data store with the converted EPG data when any conflict is resolved in favor of the converted EPG data.

11. The method of claim 10, wherein the step of resolving conflicts comprises:
comparing the converted and existing EPG data; and
resolving the conflict in favor of the EPG data contain a value representing higher quality.

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12. A computer-readable medium having computer-executable modules for combining electronic program guide (EPG) data from multiple EPG content providers, the modules comprising:

an EPG content services module for creating and managing an EPG content data store;
an EPG content transport module for retrieving EPG data from a plurality of sources in a plurality of source-specific formats; and
an EPG content provider module for converting EPG data received from the EPG content transport module from the plurality of source-specific formats to an EPG content data store format and for delivering the EPG data in the EPG content data store format to the EPG content services module.

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13. The computer-readable medium of claim 12, wherein the EPG content services module further registers each EPG content provider in the EPG content data store.

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14. The computer-readable medium of claim 12, wherein the EPG content services module is further operable for resolving conflicts between similar EPG data from the EPG content providers.

20

15. The computer-readable medium of claim 14, wherein the EPG content services module determines if a conflict exists between the similar EPG data by comparing channel values and start time values contained in the EPG data.

16. The computerized system of claim 14, wherein the EPG content services function resolves a conflict between the similar EPG data by selecting the EPG data containing a value representing higher quality.

5 17. A digital processing system comprising:

 a processor;

 communications circuitry communicatively coupled to the processor;

 a computer-readable medium communicatively coupled to the central processor;

and

10 an application program executed from the computer-readable medium by the processor, wherein the application program combines electronic program guide (EPG) data from multiple EPG content providers by retrieving the EPG data through the communications circuitry and converting the EPG data from source-specific formats to an EPG content data store format.

15

18. The digital processing system of claim 17, wherein the communications circuitry comprises tuning circuitry for tuning and receiving broadcast transmissions.

20

19. The digital processing system of claim 17, wherein the communication circuitry comprises a modem.

25

20. A computer-readable medium having stored thereon a data structure, comprising:

 a first data field containing data representing an electronic program guide (EPG) content provider;

 a second data field containing data representing an EPG provided by the EPG content provider identified by the first data field;

 a third data field containing data representing a content channel listed in the EPG identified by the second field; and

a fourth data field containing data representing an event delivered in the content channel identified by the third data field.

21. The computer-readable medium of claim 20 further comprising a fifth data field
5 containing data representing a measure of quality of the EPG content provider identified by the first data field.

22. The computer-readable medium of claim 20 further comprising a fifth data field containing data representing a measure of quality of the EPG identified by the second
10 field.

23. The computer-readable medium of claim 20 further comprising a fifth data field containing data representing a rating of the event identified by the fourth data field and further comprising a sixth data field containing a value representing a logical connection
15 to the fifth data field.

24. A computerized system for combining electronic program guide (EPG) data from multiple EPG content providers, the system comprising:

an EPG content data store;

20 an EPG content services function having means for creating and managing the EPG content data store;

a plurality of EPG content transport functions having means for retrieving EPG data from a plurality of sources in a plurality of source-specific formats; and

25 a plurality of EPG content provider functions, each EPG content provider function having means for receiving the EPG data in a source-specific format from an EPG content transport function, converting EPG data from a source-specific format to an EPG content data store format, and delivering the EPG data in the EPG content data store format to the EPG content services function.

25. The computerized system of claim 24, wherein the EPG content services function further has means for registering each EPG content provider in the EPG content data store.

5 26. The computerized system of claim 24, wherein the EPG content services function further has means for resolving conflicts between similar EPG data from the multiple EPG content providers.

10 27. A system for combining electronic program guide (EPG) data comprising:
 a plurality of sources configured to provide the EPG data in multiple formats; and
 a content organizer configured to combine the multiple EPG data formats.

28. The system of claim 27, wherein the content organizer is configured to combine the multiple EPG data formats into a single EPG data format.

15 29. The system of claim 27, wherein the content organizer comprises:
 an EPG content data store;
 an EPG content services function for creating and managing the EPG content data store;
 a plurality of EPG content transport functions for retrieving the EPG data from the plurality of sources; and
 an EPG content provider function for receiving the EPG data from the EPG content transport functions, converting EPG data from the multiple formats to an EPG content data store format, and delivering the EPG data in the EPG content data store format to
25 the EPG content services function.

30. The system of claim 29, wherein the EPG content services function registers an EPG content provider in the EPG content data store.

31. The system of claim 29, wherein the EPG content services function resolves conflicts between similar EPG data from the multiple sources.

32. The system of claim 31, wherein the EPG content services function determines if a conflict exists between the similar EPG data by comparing channel values and start time values contained in the EPG data.

10 33. The system of claim 31, wherein the EPG content services function resolves a conflict between the similar EPG data by selecting the EPG data containing a value representing higher quality timeliness.

15 34. The system of claim 31, wherein the EPG content services function resolves a conflict between the similar EPG data by selecting the EPG data containing a description of higher quality.

35. The system of claim 31, wherein the EPG content services function resolves a conflict between the similar EPG data based on the source of the EPG data.

36. The system of claim 29, wherein at least one of the sources is an in-band source.

20 37. The system of claim 29, wherein at least one of the sources is an out-of-band source.

25 38. A method of combining electronic program guide (EPG) data comprising the steps of:

receiving the EPG data in multiple formats; and
combining the multiple EPG data formats.

39. The method of claim 38, wherein the step of combining the multiple EPG data formats comprises the step of combining the multiple EPG data formats into a single EPG data format.

5 40. The method of claim 38, wherein the step of combining the multiple EPG data formats comprises the steps of:

converting the EPG data from the multiple formats to a format for the EPG content data store;

adding the converted EPG data to the EPG content data store when there is no

·10 conflict between the converted EPG data and EPG data existing in the EPG content data store;

resolving conflicts between the converted EPG data and existing EPG data; and

updating the EPG content data store with the converted EPG data when any conflict is resolved in favor of the converted EPG data.

15

41. A computer-readable medium having a computer executable module for combining electronic program guide (EPG) data, the module comprising:

a content organizer module to combine multiple EPG data formats from a plurality of sources.

20

42. The computer-readable medium of claim 41, wherein the content organizer module combines the multiple EPG data formats into a single EPG data format.

43. The computer-readable medium of claim 41, wherein the content organizer module comprises:

an EPG content services module for creating and managing an EPG content data store;

an EPG content transport module for retrieving the EPG data from the plurality of sources; and

an EPG content provider module for converting the EPG data retrieved from the plurality of sources from the multiple formats to an EPG content data store format and for delivering the EPG data in the EPG content data store format to the EPG content services module.

5

44. A system for combining electronic program guide (EPG) data comprising:
a plurality of source means for providing multiple formats of EPG data; and
a content organizer means for combining the multiple EPG data formats.

10

45. The system of claim 44, wherein the content organizer means combines the multiple EPG data formats into a single EPG data format.

46. The system of claim 44, wherein the content organizer means comprises:
an EPG content data store;
an EPG content services function having means for creating and managing the EPG content data store;
a plurality of EPG content transport functions having means for retrieving EPG data from the plurality of sources; and
an EPG content provider function having means for receiving the EPG data and
converting the EPG data from the multiple formats to an EPG content data store format,
and delivering the EPG data in the EPG content data store format to the EPG content services function.

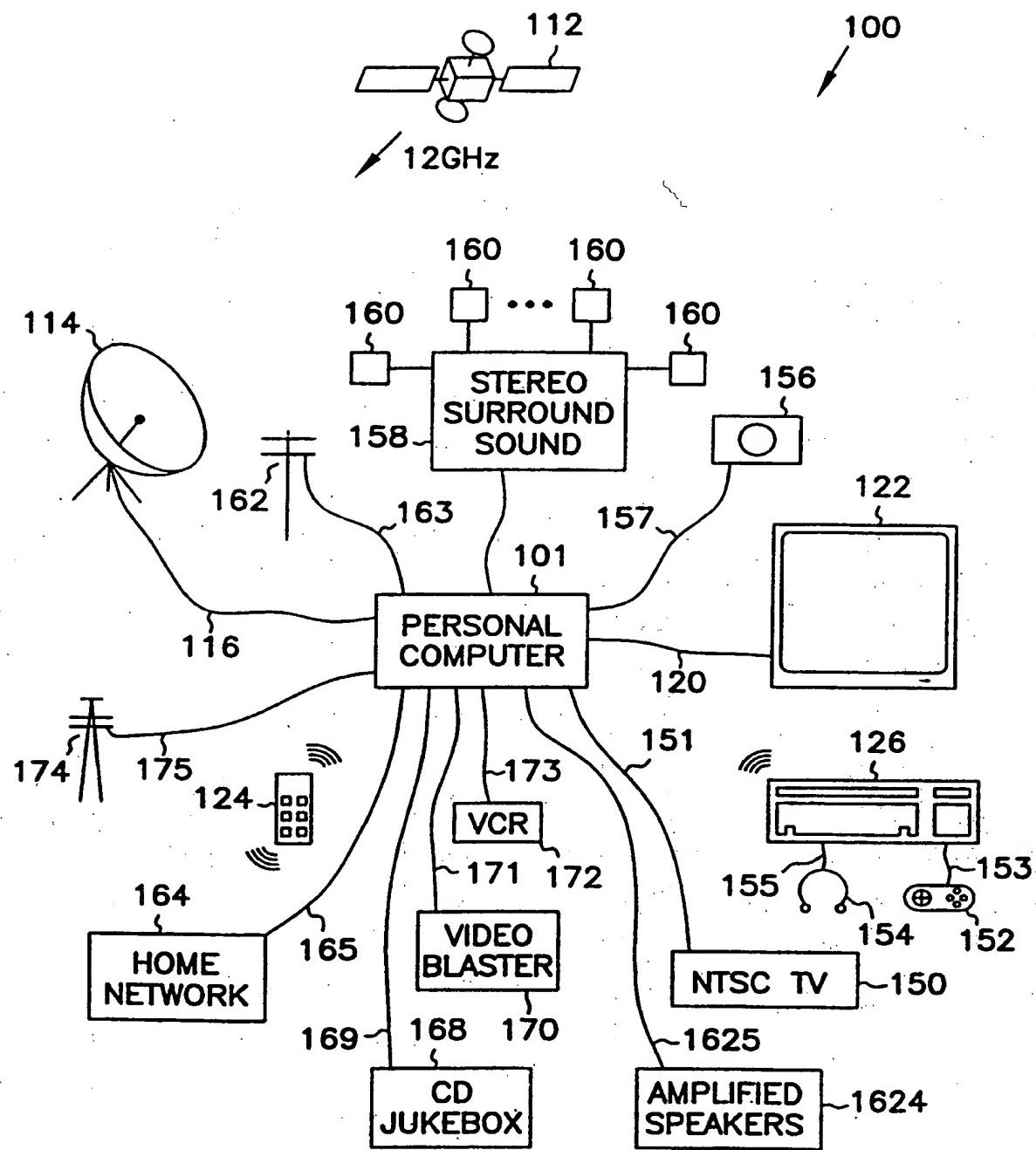


FIG. 1A

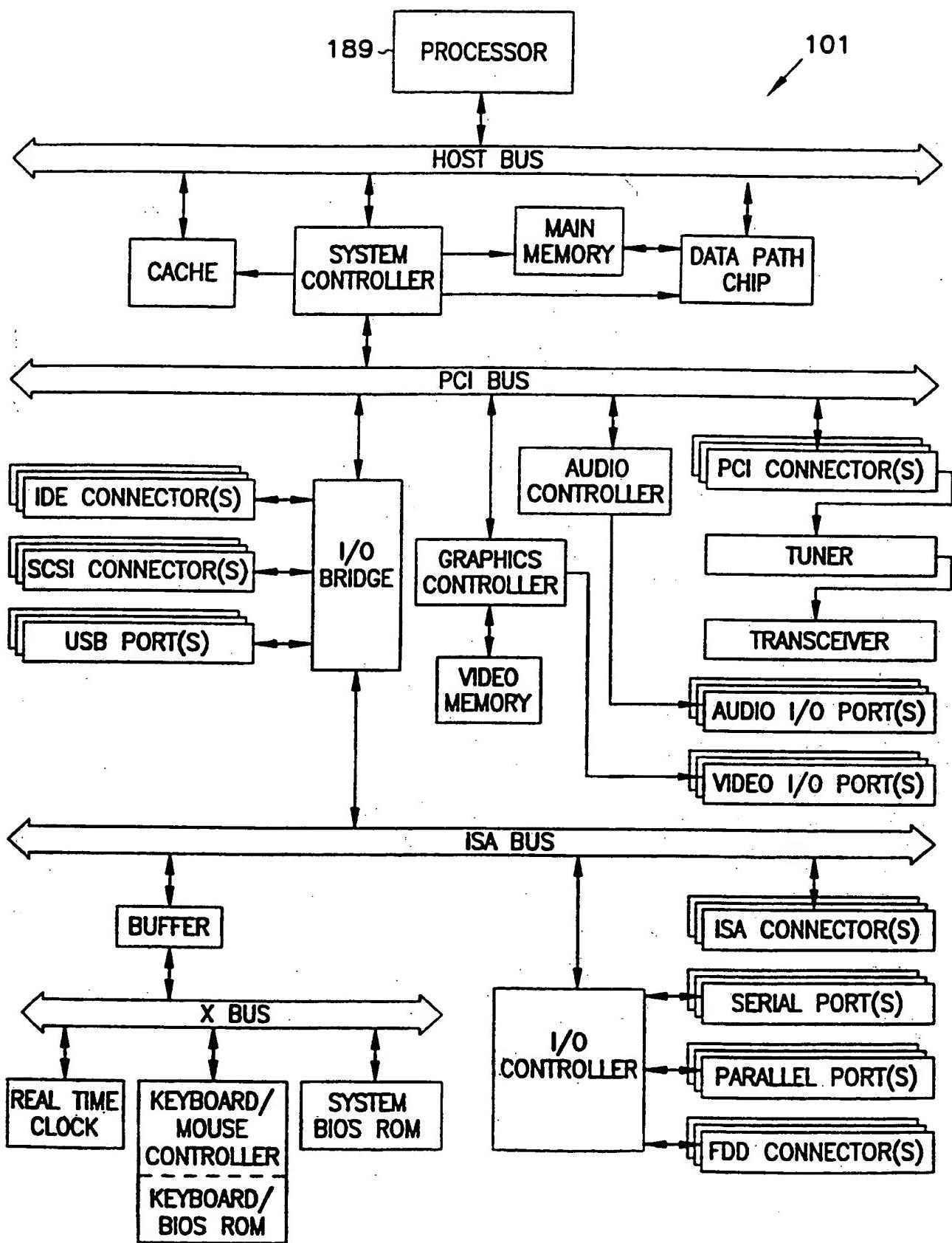


FIG. 1B

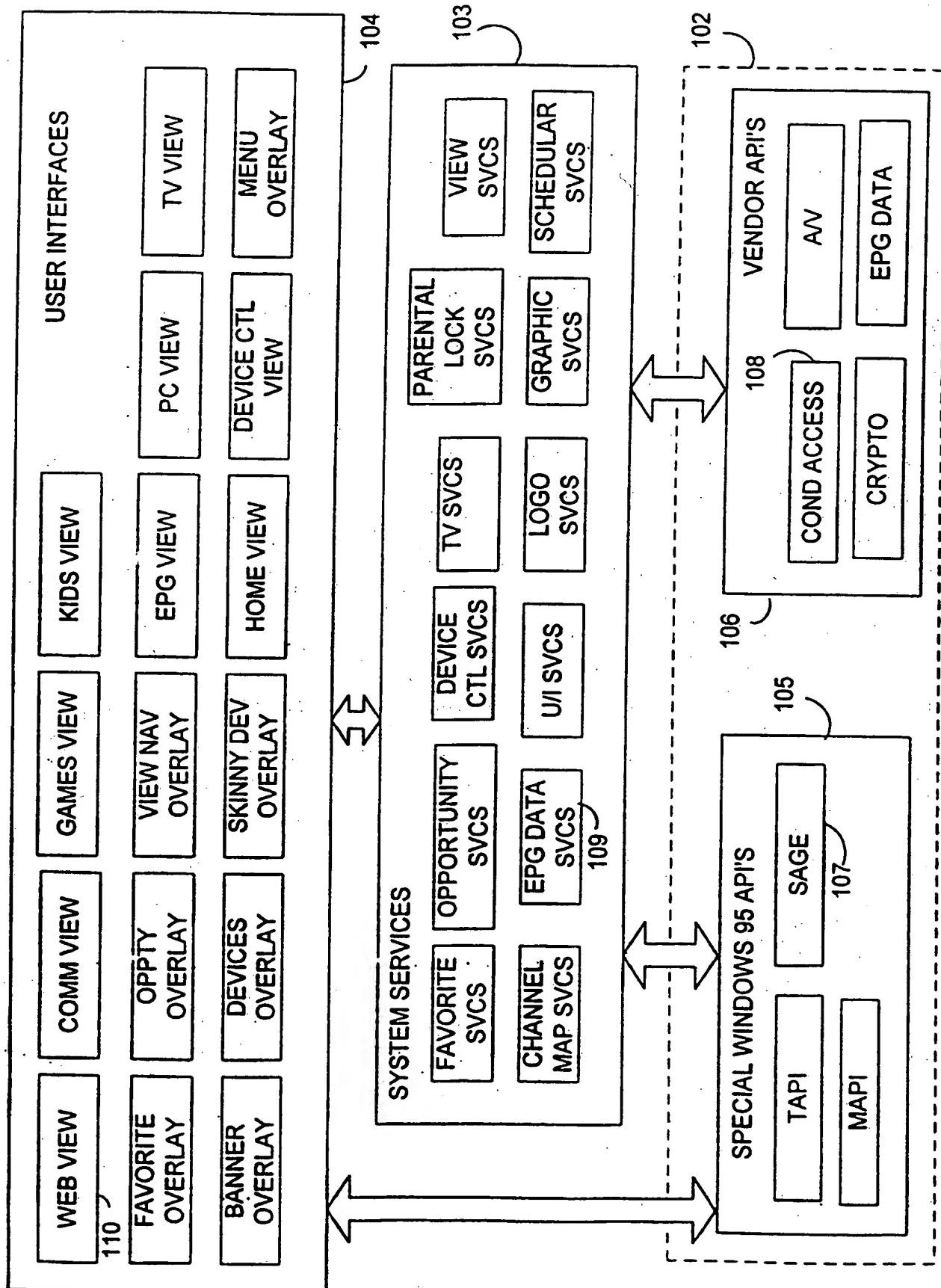
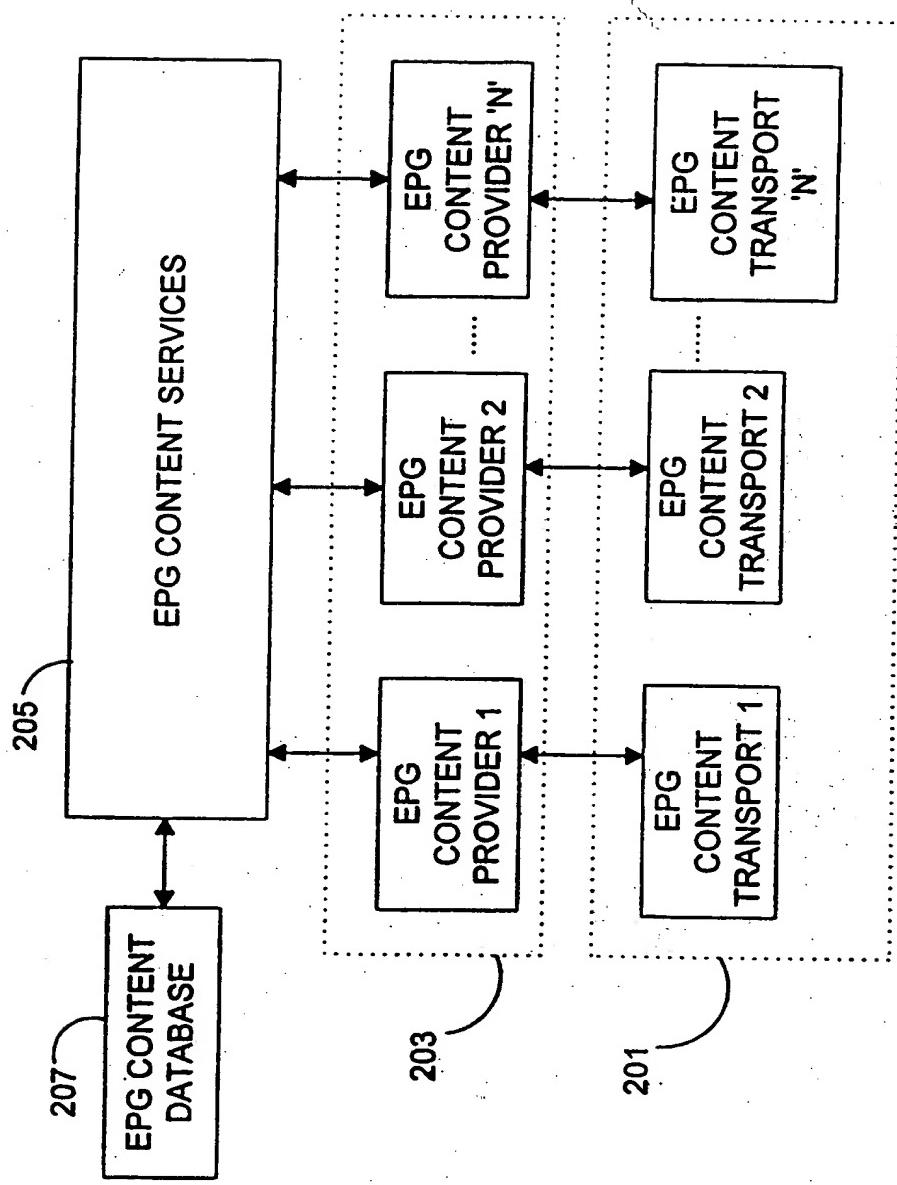


FIG. 1C

**FIG. 2**

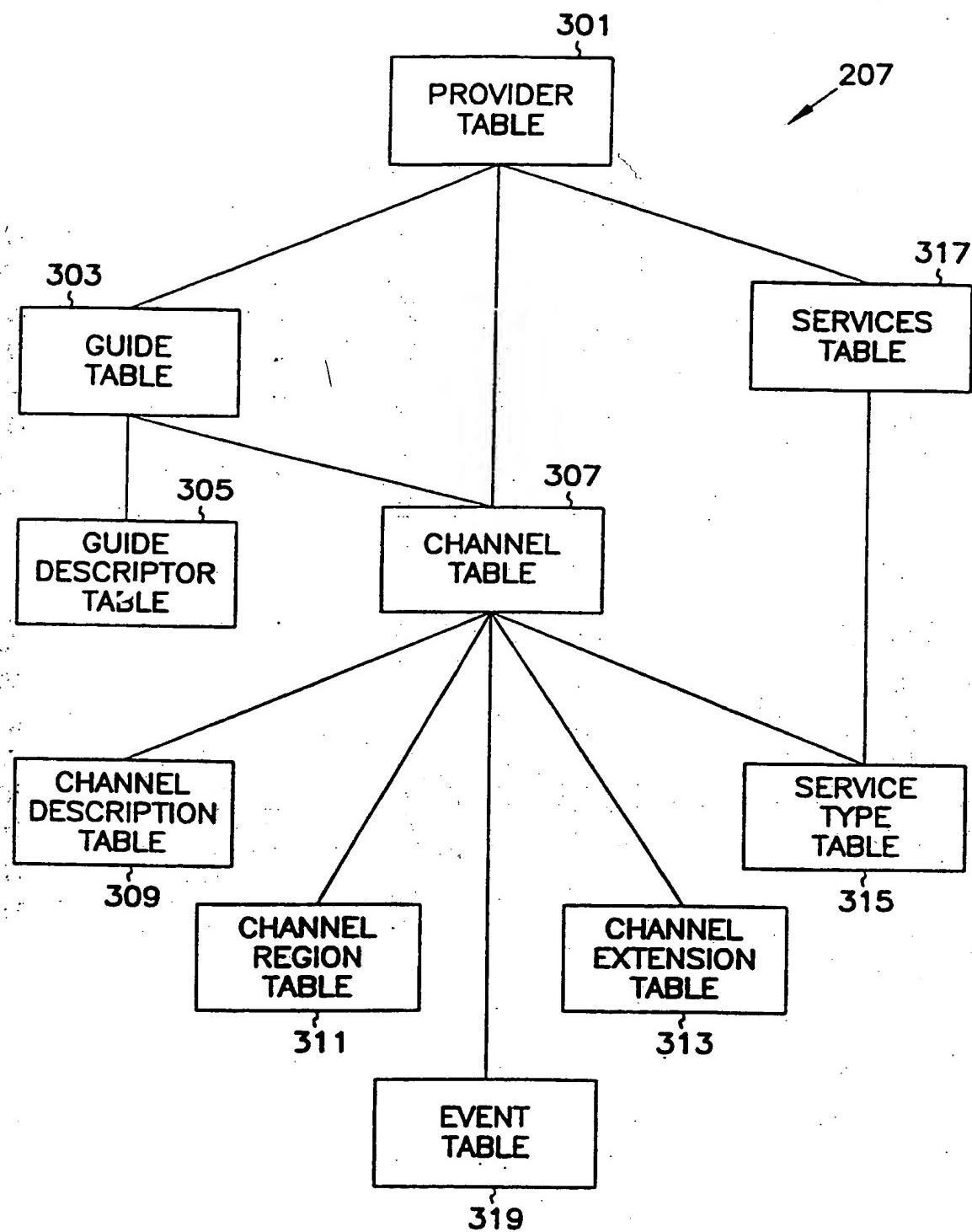


FIG. 3

400

PROVIDER IDENTIFIER	401
PROVIDER TYPE	403
PROVIDER TIMELINES	405
PROVIDER NEXT UPDATE	407
PROVIDER QUALITY	409
SERVICE PROVIDER NAME	411
CONTENT PROVIDER NAME	413
GUIDE PROVIDER NAME	415

FIG. 4

500

GUIDE IDENTIFIER	501
PROVIDER IDENTIFIER	503
STARTING SLOT	505
STARTING DAY	507
VALIDITY	509
LIFETIME	511
GUIDE WIDTH	513
SLOT LENGTH	515

FIG. 5

The diagram illustrates a list of fields for a guide entry, each associated with a reference number. A curved arrow points from the reference number 600 to the first field, "GUIDE IDENTIFIER".

600	GUIDE IDENTIFIER	601
	PROVIDER IDENTIFIER	603
	DISPLAY CHANNEL NUMBER	605
	PHYSICAL CHANNEL NUMBER	607
	SHORT NAME	609
	LONG NAME	611
	CONDITIONAL ACCESS	613
	NUMBER OF STREAMS	615
	PURCHASE INFORMATION	617

FIG. 6

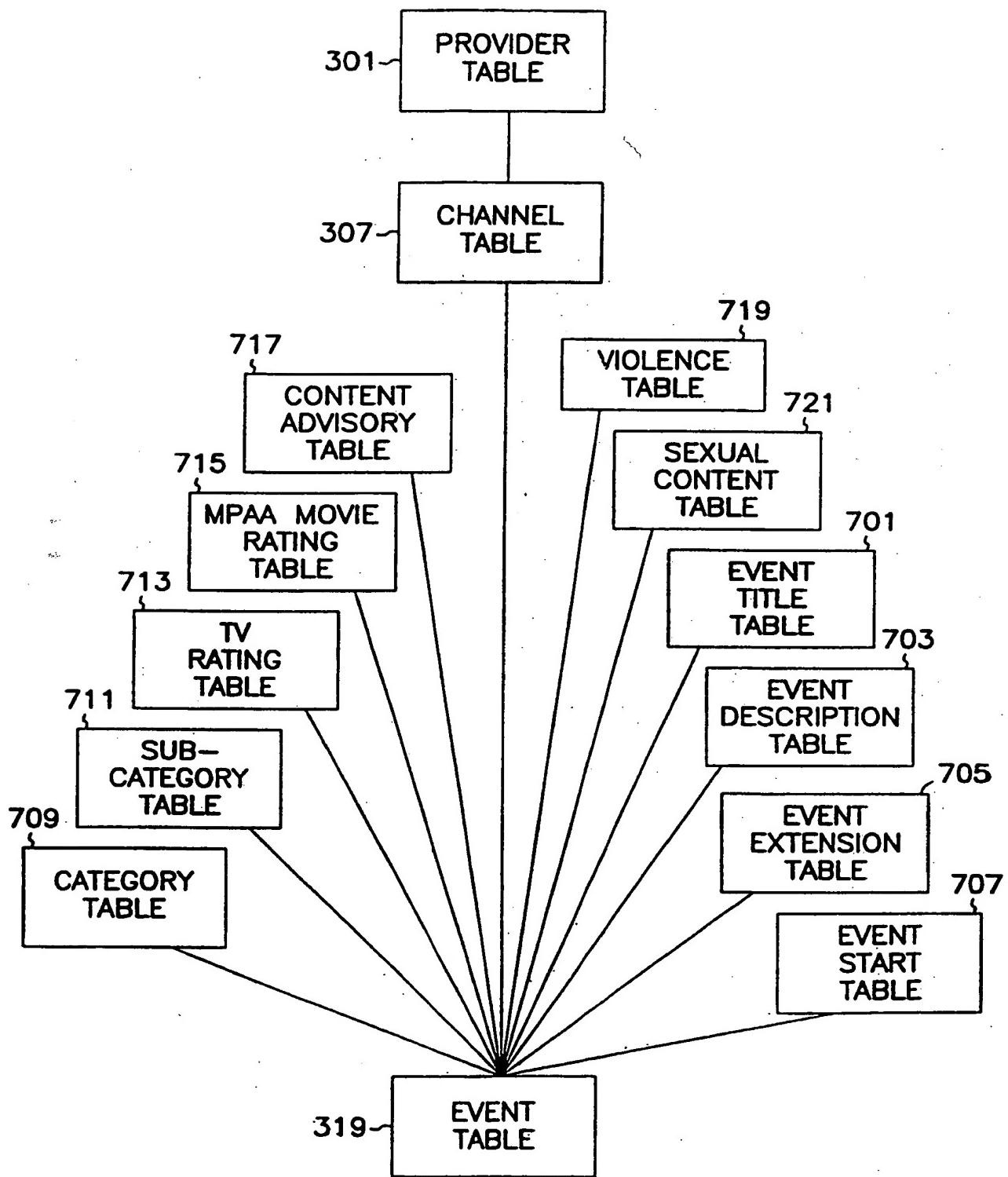


FIG. 7

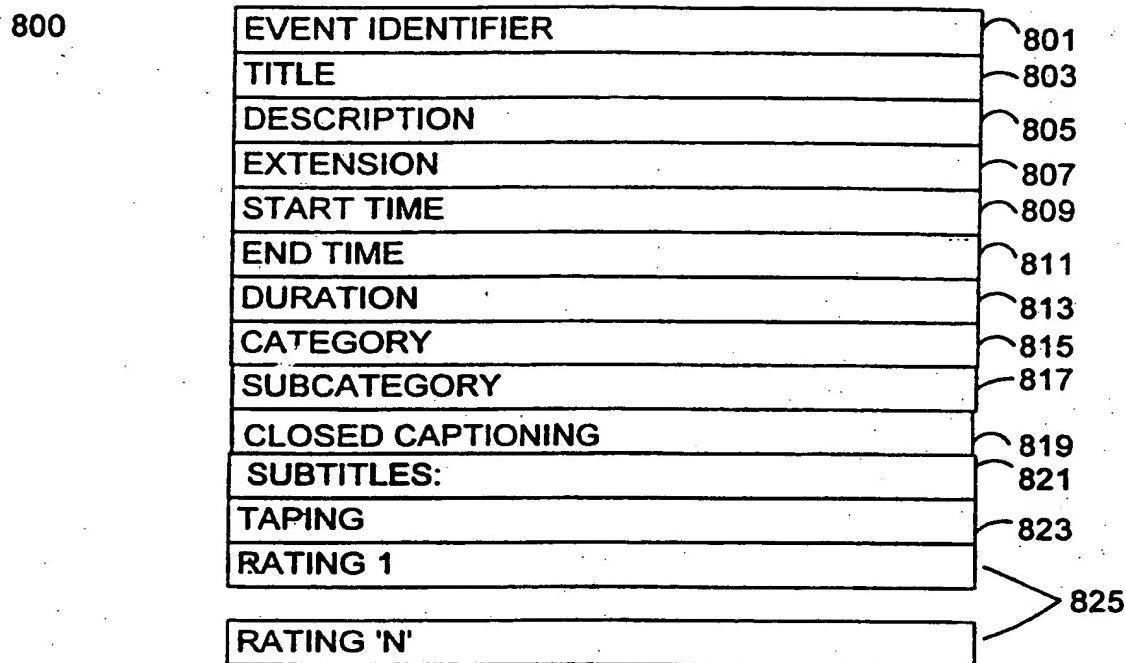
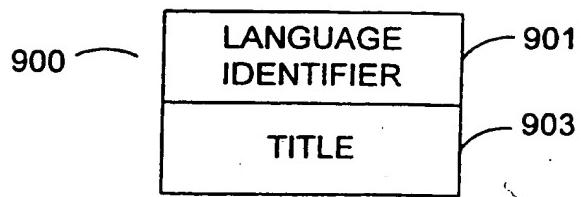
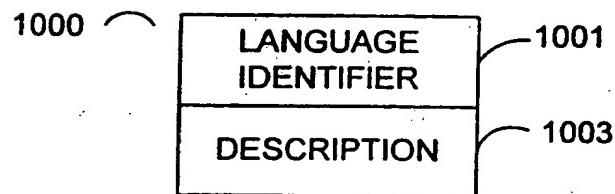
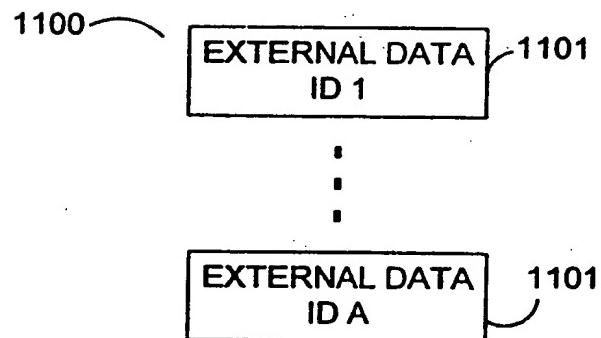
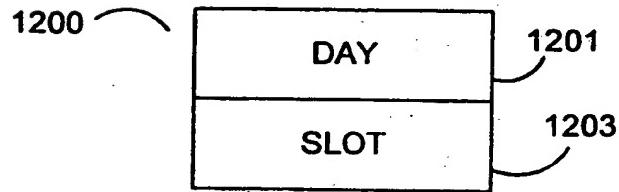


FIG. 8

**FIG. 9****FIG. 10****FIG. 11****FIG. 12**

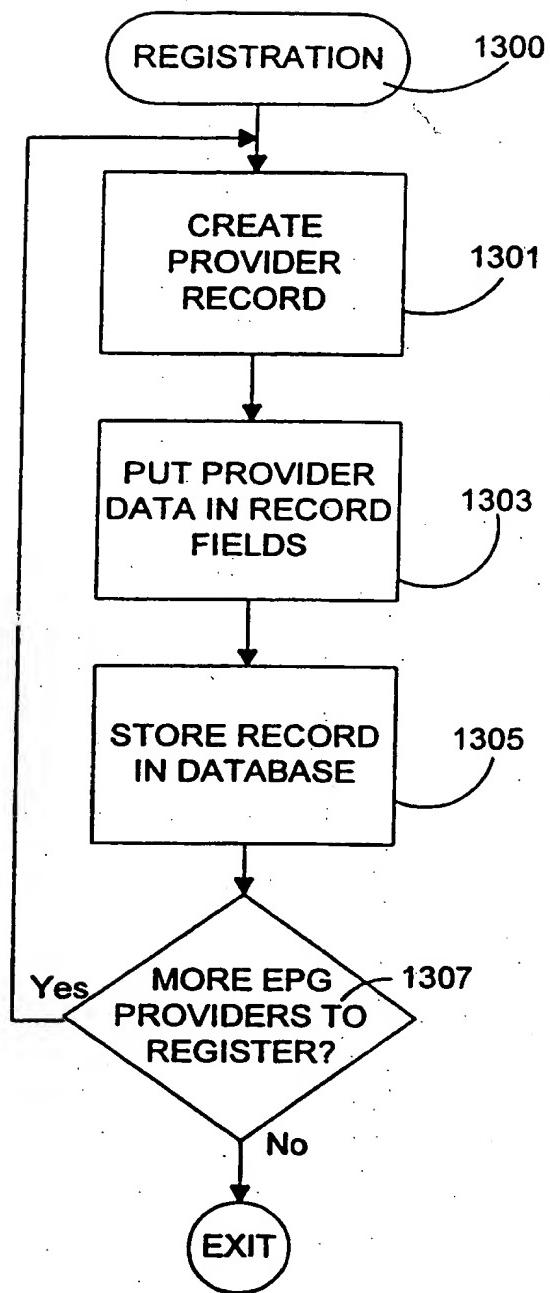


FIG. 13

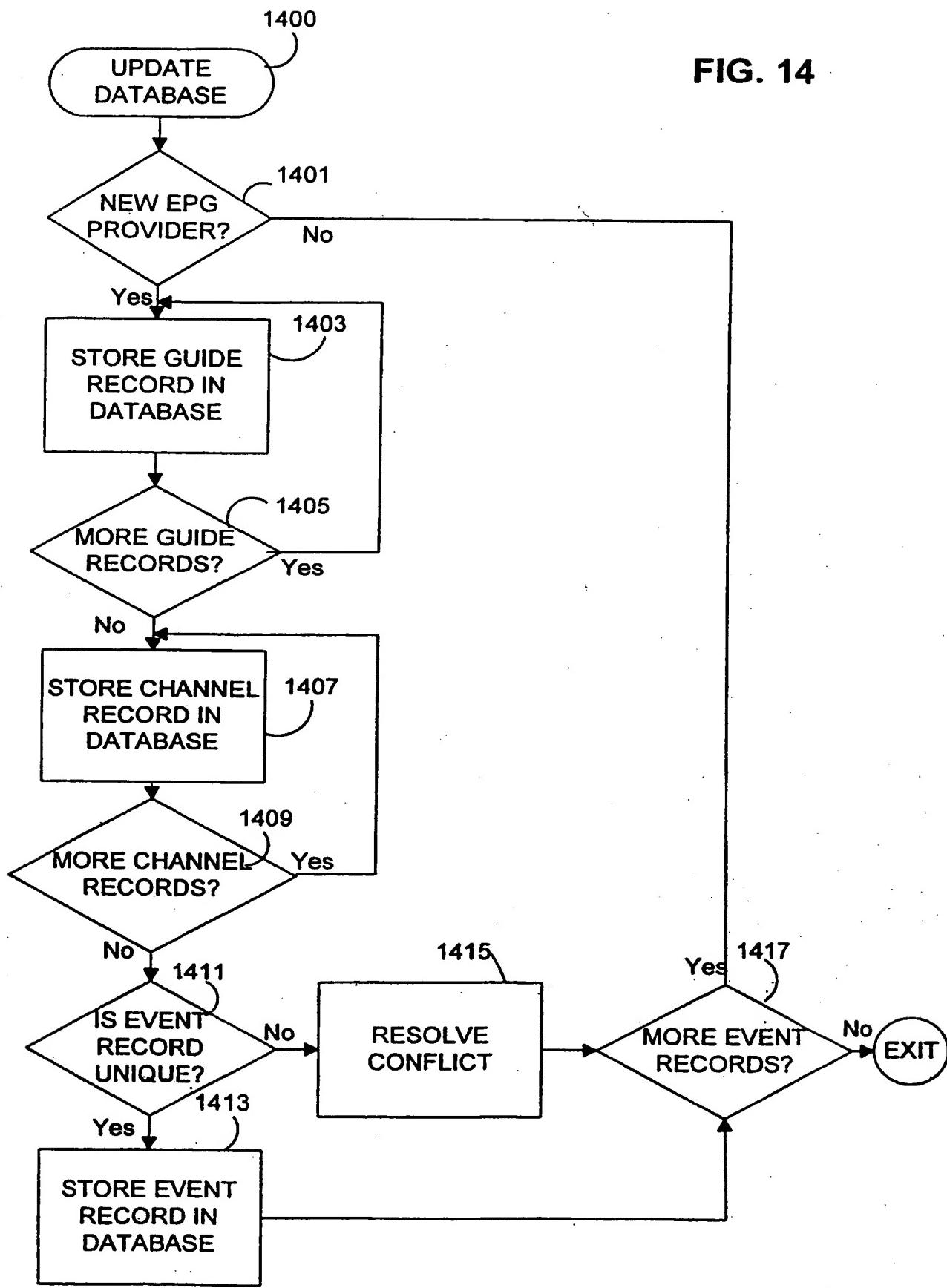
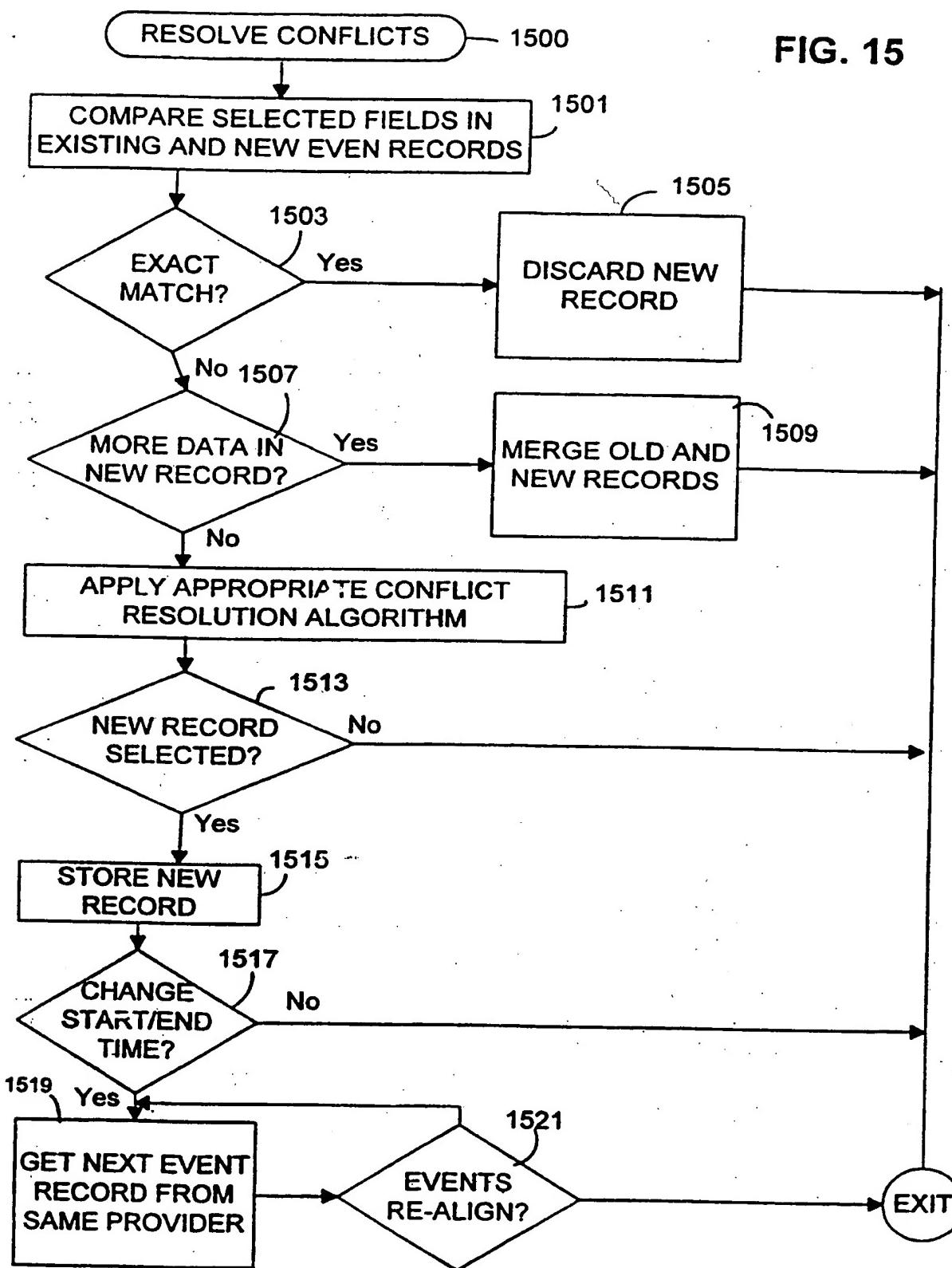


FIG. 15



INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/00093

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H04N7/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 08 275077 A (SONY CORP) 18 October 1996	1,2,8,9, 12,13, 17-20, 24,25, 27-30, 36-39, 41-46 3-7,10, 11, 14-16, 21-23, 26, 31-35,40
A	& US 5 808 694 A see abstract see column 1, line 1 - column 2, line 24 see column 3, line 27 - column 6, line 17 see column 8, line 20 - column 12, line 5 see column 13, line 35 - column 13, line -/-	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "O" document referring to an oral disclosure, use, exhibition or other means
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- "&" document member of the same patent family

Date of the actual completion of the international search

16 April 1999

Date of mailing of the international search report

22/04/1999

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/00093

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>42 see column 17, line 8 - column 18, line 29 see figures 1-3,7,8,23-25</p> <p>---</p> <p>US 5 576 755 A (DAVIS BRUCE ET AL) 19 November 1996</p>	<p>1,2,8,9, 12,13, 17-20, 24,25, 27-30, 36-39, 41-46 3-7,10, 11, 14-16, 21-23, 26, 31-35,40</p>
A	<p>see abstract see column 3, line 5 - column 3, line 66 see column 4, line 25 - column 7, line 55 see figure 1</p> <p>---</p>	
X	<p>US 5 666 645 A (GUSTAFSON DAVID W ET AL) 9 September 1997</p> <p>---</p>	<p>1-3,8,9, 12,13, 17-19, 24-31, 36-39, 41-46 4-7,10, 11, 14-16, 20-23, 32-35,40</p>
A	<p>see abstract see column 1, line 45 - column 2, line 25 see column 5, line 15 - column 8, line 45 see figures 1-4</p> <p>-----</p>	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/00093

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			WO	9613935 A	09-05-1996
US 5666645	A	09-09-1997	AU	5631396 A	18-11-1996
			CA	2219021 A	31-10-1996
			EP	0823176 A	11-02-1998
			WO	9634486 A	31-10-1996